

# Mammoth Creek Forest Stewardship Plan

Mammoth Creek Homeowners Association  
P O Box 734  
Panguitch, UT 84759



June 2002

Prepared By:

Clint Reese, Area Forester  
State of Utah  
Department of Natural Resources  
Division of Forestry, Fire and State Lands  
Southwest Area Office  
585 North Main Street  
Cedar City, UT 84720

(435) 586-4408  
FAX (435) 586-2789  
email: [clintreese@utah.gov](mailto:clintreese@utah.gov)

## Table Of Contents

<b>Introduction .....</b>	<b>1</b>
Forest Health Goals .....	1
Project Description .....	2
Project Area .....	2
Public Interest .....	3
Plan of Action .....	3
Objectives .....	6
<b>General Site Description .....</b>	<b>7</b>
Property Location .....	7
<b>General Soil and Topographic Information (<i>Source: USFS Soil Survey</i>) .....</b>	<b>9</b>
<b>Wildlife and Fisheries Information .....</b>	<b>12</b>
<b>Endangered Plant and Animal Species Observed or Known to Occur In The Area .....</b>	<b>12</b>
<b>Aesthetic Resources and Concerns .....</b>	<b>13</b>
<b>Resource Description and Management Recommendations .....</b>	<b>13</b>
Stand Narratives .....	14
Understory Description .....	15
Fuel Types, Loading and Special Burning, Wildfire or Interface Considerations .....	15
Specific Wildlife, Aesthetic and Recreational Information .....	17
Specific Soil, Water and Wetland Information .....	17
Specific Insect and Disease problems .....	21
Specific endangered species and historic and cultural information .....	23
Past Management or other Activities .....	23
Any other information that may be of importance in the management of the property ..	23
Stand Management Recommendations .....	25
Specific Actions Needed to Protect Valuable or Endangered Resources .....	28
Future Actions That May Be Required .....	28
Forest Resource Protection .....	28
<b>Practice Implementation Schedule .....</b>	<b>31</b>
<b>Certifications and Approvals .....</b>	<b>32</b>
<b>List of Appendices .....</b>	<b>33</b>

## **Introduction**

*Forestry terms have been defined for your convenience in the Appendix of this document.*

In 1996, the division was successful in being awarded a \$50,000 grant as part of the Western Forest Health Initiative. Grant funding was authorized by the U.S. Forest Service, State and Private Forestry. This Forest Stewardship Plan (FSP) has been prepared and satisfies Project Output #3 identified in the grant.

In 1993, following approximately five years of drought in southwest Utah, bark beetle populations began to sharply increase resulting in tree mortality primarily in ponderosa pine and spruce. The increase in bark beetle populations was noted primarily on public lands administered by the Dixie National Forest. Within these national forest lands, however, are many thousands of acres of non-industrial private forest (NIPF) land. Soon, the bark beetles began to infest trees on private lands, which began a public outcry for assistance in dealing with these problems.

Because of these factors, work began during the winter of '93-'94 to effectively deal with declining forest health conditions. The US Forest Service began work on the national forest lands and developed the Mammoth-Duck Creek Recovery Project, while the Division of Forestry began assisting private landowners with the management of their forest lands. From 1994 to 1997, the division (FFSL) conducted tree inventories and lot inspections using seasonal crews, and provided recommendations to private landowners in Mammoth Creek, and other subdivisions on Cedar Mountain.

Many of the recommendations the division provided to landowners dealt with application of chemicals used to protect individual, high value trees. Chemical application or spraying is a relatively low cost, preventative measure that can be quickly done to provide protection to susceptible trees. The major drawback to spraying however, is that it is only a preventative short-term treatment, and does not address the long-term forest health problem of having "too many trees." Simply, the forests at Mammoth Creek are too thick and need to be thinned. Landowners in the subdivisions of Mammoth Creek have recognized this problem and the need for further management.

A brief explanation of the Western Forest Health Initiative follows:

### **Forest Health Goals**

The purpose of the Forest Health Program (FHP) is to provide technical assistance, detect and evaluate forest insect or disease outbreaks, recommend appropriate response strategies and coordinate actions necessary to control significant outbreaks. It is also the purpose of the FHP to assist division service foresters and other partners by providing information, education, technical assistance, and appropriate management strategies to prevent pest epidemics and achieve healthy forest stand conditions.

Utah's Forest Health Program contributes to a strategic Division goal to "provide for long term sustainability of natural resources on non-federal forest, range, and watershed lands."

## **Project Description**

The project area involves over 3,000 acres of NIPF land within the Dixie National Forest. The land is distributed among five separate and geographically dispersed blocks of private forest land which has been fragmented from an ownership perspective. Fire has been excluded from the landscape resulting in conversion of ponderosa pine to mixed conifer types, or stagnation of pure ponderosa pine stands.

The areas of interest have been suffering from an intense mountain pine & spruce beetle epidemic during the past several years. Dwarf mistletoe and other pathogenic agents are also contributing to declining forest health.

There are a number of important issues we hope to address on private lands and the greater landscape which includes National Forest lands. They include:

- Forest Health,
- Integration of diverse management objectives on multiple ownerships,
- Forest productivity on fragmented ownerships,
- Ecosystem restoration and sustainability, and
- Protection of life & property in an interface area.

Management objectives include enhancing forest ecosystem health and forest ecosystem recreation opportunities for long term benefits. Wood products will be an output, but not a primary objective of the landowners.

## **Project Area**

The geographic setting of the proposed project area is the Markagunt Plateau East of Cedar City in Iron, Kane, and Garfield counties.

The Division, collaboration with the Dixie National Forest and the Ogden Field Office of the USDA Forest Service, Forest Health Protection (FHP) responded to bark beetle outbreaks on private lands in the areas referred to as Duck Creek, Strawberry Valley, and the Panguitch Lake area, which includes Mammoth Creek.

These areas are all located within 30 air miles (east) of Cedar City, Utah along Highways 14 and 143. The project area landscape includes Cedar Breaks National Park and Brian Head Ski Area. Highway 14 is a major travel route between Zion National Park and Bryce Canyon National Park. It is also within a four hour drive of Grand Canyon National Park. The area is a major year round recreation destination for people from Las Vegas, Nevada; Phoenix, Arizona; and Salt Lake City, Utah.

The area experiences high recreation use, primarily from summer cabin sites and other outdoor activities. Adjacent landownership is largely National Forest land which is also suffering the same consequences from beetle activity and mistletoe. Forest types are mixed conifer comprised of Ponderosa Pine, Douglas-fir, and White Fir. Aspen is associated with these stands as well.

Many of the private land blocks within the project area have been fragmented into hundreds of small parcels which now include summer homes and recreation properties within a forest landscape.

## **Public Interest**

Numerous property owners, along with the Dixie National Forest, are concerned about declining forest health in the area. The Division of Forestry, in partnership with the Dixie N.F., Utah Department of Agriculture, and State & Private Forestry - Forest Health Protection, have been involved in a forest health assessment and treatment project. The coordinated project has primarily focused on identification of infested trees and bark beetle activity, partial inventory, landowner education, and individual tree treatment/removal to protect high value areas. The project has been received well by the public and is successful in that regard. However, the effects of current management activities are short term and have not looked at long term management strategies.

## **Plan of Action**

### ***Project Objectives***

The purpose of this project is to address major forest resource problems in the project area include forest health, species diversity, stand structure, sustainability, & ecosystem function. Accomplishment will require the Division to take the following steps.

1. Assess current stand structure and evaluate risk to stands on NIPF land.
2. Facilitate treatment of high risk/high value trees.
3. Reduce risk over time by developing stand level silvicultural prescriptions.
4. Educate the public on the potential impacts of the beetle and mistletoe on their forest land, and appropriate alternatives for responding to the outbreak.
5. Describe stand structure and density management guidelines that will meet landowner objectives, provide for forest health, restore ecosystem function and mitigate wildfire hazards.
6. Develop management strategies in the form of a forest stewardship plan.

### ***Outreach Objectives***

Outreach efforts have concentrated on coordination with homeowner associations to explain the project, obtain their support, develop a consensus for an integrated forest health/stewardship plan for the Mammoth Creek area. The Division has also solicited

commitment to implement via homeowner/association participation in follow up practices. Outreach efforts have included a survey of individual homeowners in the Duck Creek area to better understand their land ownership objectives, explain project work to be undertaken, and obtain permission to collect data on their property.

Administration of this project shall be coordinated across a large landscape including National Forest and multiple private ownerships. The Division would like to have an existing partnership evolve to include NFS lands in a coordinated ecosystem management approach to address forest health, productivity, sustainability and fragmentation on a landscape level.

### ***Project Activities***

1. Sanitize & Salvage - Hire and train a two person project crew to mark dead & dying trees (mortality trees) for removal and high value at high trees for protective treatment in stands in the Brian Head and Mammoth Creek areas. Plot and map "treatment" trees on a lot sketch map.
2. Stand Examination - Conduct stand examinations in Duck Creek, Brian Head, and Mammoth Creek subdivisions. Gather precise tree/stand data using sample points to allow development of silvicultural prescriptions and density management guidelines.
3. Coordinate Treatment - Assist landowners in contracting for services to treat or remove treatment trees. Provide list of licensed pesticide applicators, timber contractors, and sample contracts.
4. Forest Health - Develop a forest stewardship plan for the Duck Creek demonstration area that addresses species diversity, stand structure, sustainability, landowner objectives, & ecosystem function.

### ***Project Outputs***

1. Landowner Report - Report to lot owners to include results of lot inspections and recommendations for prevention, sanitation, and salvage.
2. Project Report - Provide summary of project results including the number of landowners serviced, acres surveyed, and summary of stand data including "treatment" tree categories. Provided to Mammoth Creek and Brian Head Home Owners Association (HOA) and FHP, S&PF.
3. Forest Health & Stewardship Plan - For the HOA, Duck Creek Demonstration Area.
4. Training for Applicators and Loggers - Provide prospective contractors with information on what was found (treatable trees, recoverable volume, non-merchantable removals, etc.), appropriate registered pesticides, application

procedures, insect damage recognition, directional falling and safety in developed areas.

## Objectives

Landowner *(In order of priority)* **(NOTE: Goals are based on responses of a survey of Duck Creek residents. Responses are assumed to be similar for Mammoth Creek residents based on the type of ownership (cabin lots) and uses (primarily summer and weekend recreation)).**

- 1) Improve and enhance forest health conditions and regeneration;
- 2) Improve wildlife habitat;
- 3) Minimize potential impacts associated with management activities such as visual quality, soil erosion and in-stream sedimentation;
- 4) Maintain and/or improve recreational opportunities through vegetative manipulation;
- 5) Reduce the likelihood of fire events, and their severity;
- 6) Promote a restoration of the ecosystem, thereby inducing changes that more closely approximate historic patterns in the landscape;
- 7) Enhancing forest diversity, long term productivity and sustainability;

**Additionally, the following information was collected by homeowners using the survey:**

- 1) The majority of landowners have second homes on their property for use as recreation.
- 2) The majority of landowners would take action to protect resources and values important to them.
- 3) A majority of landowners would like to continue to receive advice from a resource professional, and would welcome being contacted.

### ***Division of Forestry, Fire & State Lands***

The Objective of the Division of Forestry, Fire and State Lands' Forest Stewardship Program is to encourage long-term stewardship of non-industrial private forest lands by assisting private landowners with the active management of their forest and natural resources.



## General Site Description

### Property Location

#### *Legal Description*

Township 37 South; Range 7 West  
Parts of Sections 3, 4, & 5  
Salt Lake Baseline and Meridian

#### Acreage and Breakdown of Forest, Range and Agricultural Acreage

Forest Acres:	<b>513</b>
<u>Low Site/Rock Outcrop/Meadow Acres:</u>	<b><u>252</u></b>
<b>Total Acres:</b>	<b>765</b>

#### *General Forest and Resource Description*

The Mammoth Creek Subdivision lies within the ponderosa pine forest type of the Markagunt Plateau in Garfield County Utah. The Mammoth Creek drainage begins on USFS lands adjacent to the subdivision where large springs supply water for stream flow. Although the primary tree species is ponderosa pine, other trees found in the area are Douglas-fir, blue spruce, white fir, aspen, and bristlecone pine. Uplands, especially north facing aspects contain forest cover. Southern exposures are typically low site areas that contain a great deal of exposed rock. Adjacent to Mammoth Creek itself, forest vegetation gives way to open meadows with long-stemmed grasses, forbs and wetland species.

#### *Yearly Precipitations and Site Temperature*

*Source: USFS Soil Survey*

Yearly Precipitation:	<b>10 to 35 inches</b>
Mean Annual Temperature:	<b>36 to 45 degrees F</b>
Watershed Name:	<b>Upper Sevier*</b>
Watershed Hydrologic Unit Code:	<b>16030001</b>

*\*Note: The Upper Sevier is a Category I Watershed. Category I Watersheds have been identified in the Unified Watershed Assessment of the Clean Water Action Plan - and Watershed Restoration Priorities for Utah.*

#### *Elevation*

**7700 to 8200 feet**

## ***Access***

From SR 143 near the Garfield/Iron county line (west of Panguitch Lake) take the Mammoth Creek - Duck Creek road approximately 3 miles south arriving in the subdivision.

## ***Historic or Cultural Resources***

*Utah Code Section 9-8-302, Definitions, states:*

*(2) "Archaeological resources" means all material remains and their associations, recoverable or discoverable through excavation or survey, that provide information pertaining to the historic or prehistoric peoples of the state.*

*(6) "Excavate" means the recovery of archaeological resources.*

*(12) "Site" means any petroglyphs, pictographs, structural remains, location of archaeological deposits, or other location which is the source of specimens.*

*(13) Specimen" means all man-made artifacts and remains of an archaeological or anthropological nature found on or below the surface of the earth, excluding structural remains.*

*Utah Code Section 9-8-307, Report of discovery on state or private lands, states:*

*(2) Any person who discovers any archaeological resources on privately owned lands shall promptly report the discovery to the division [of State History].*

*(4) Nothing in this section may be construed to authorize any person to survey or excavate for archaeological resources.*

According to the Division of State History, no known sites have been recorded because no surveys have been conducted. If evidence of sites are discovered during the course of implementing this plan, the landowner must notify the Division of State History as required under Utah Code Title 9-8-307. If, upon completion of a survey by the Division of State History, archaeological resources are found to be present, mitigating measures may have to be addressed for protection. The landowner should consider any of all viable management alternatives if any such sites are discovered on or near areas designated for management.

## General Soil and Topographic Information *(Source: USFS Soil Survey)*

<b>240A - Sawdust - Shawa, calcareous families association, 2 to 8 percent slopes.</b>					
Depth Class:	very deep	Available Water Capacity:	4 - 12"	Vegetation:	Grass
Drainage Class:	well drained	Dominant Parent Material:	Limest one	Erosion Hazard:	Low
Typical Profile:	<b>Sawdust</b> 0 to 60"      Very Gravelly Loam		<b>Shawa</b> 0 to 7"      Very Fine Sandy Loam 7 to 20"      Loam and Very Fine Sandy Loam 20 to 60"      Silt Loam		

<b>P49 - Frandsen loam, 1 to 15 percent slopes.</b>					
Depth Class:	Very deep	Available Water Capacity:	9 - 10"	Vegetation	Black sagebrush and grasses
Drainage Class:	well drained	Dominant Parent Material:	sandstone limestone and shale	Erosion Hazard:	Moderate
Typical Profile:	<b>Frandsen</b> 0 to 60"      Loam				

<b>P97 - Neto very fine sandy loam, wet, 0 to 2 percent slopes.</b>					
Depth Class:	very deep	Available Water Capacity:	9 - 10"	Vegetation:	Grasses
Drainage Class:	mod. well drained	Dominant Parent Material:	mixed sedim entary rock	Erosion Hazard:	slight
Typical Profile:	<b>Neto</b> 0 to 21"      Very Fine Sandy Loam 21 to 35"      Fine Sandy Loam 35 to 60"      Silt Loam				

<b>P162 - Wiggler - Guben complex, 25 to 50 percent slopes.</b>					
Depth Class:	Shallow to Deep	Available Water Capacity:	3.5 - 5.5"	Common Trees:	Ponderosa pine

<b>P162 - Wiggler - Guben complex, 25 to 50 percent slopes.</b>					
Drainage Class:	well drained	Dominant Parent Material:	shale, sandstone and limestone	Erosion Hazard:	Mod.
Typical Profile:	<b>Wiggler</b> 0 to 7" Very Cobbly Loam 7 to 12" Loam 12 to 19" Clay Loam 19" Weathered Shale Bedrock		<b>Guben</b> 0 to 8" Gravelly Loam 8 to 60" Very Gravelly Loam		

<b>220 - Hesperus - Zillion families complex, 0 to 15 percent slopes.</b>					
Depth Class:	>60 inches	Available Water Capacity:	4.5 - 11.5"	Common Trees:	Ponderosa pine
Drainage Class:	well drained	Dominant Parent Material:	Basalt	Erosion Hazard:	Mod. Low
Typical Profile:	<b>Hesperus</b> 0 to 12" Loam 12 to 60" Silty Clay Loam		<b>Zillion</b> 0 to 9" Loam 9 to 18" Gravelly Loam 18 to 25" Gravelly Clay Loam 25 to 44" Extremely Cobbly Clay Loam 44" Basalt Bedrock		

<b>229 - Skyview - Syrett families complex, 0 to 30 percent slopes.</b>					
Depth Class:	Mod to Very Deep	Available Water Capacity:	2.5 - 7"	Common Trees:	Ponderosa pine
Drainage Class:	well drained	Dominant Parent Material:	Limestone	Erosion Hazard:	Mod. Low
Typical Profile:	<b>Skyview</b> 0 to 8" Silt Loam 8 to 14" Gravelly Silty Clay Loam 14 to 25" Very Cobbly Silty Clay Loam 25" Limestone Bedrock		<b>Syrett</b> 0 to 60" Very Gravelly Loam		

<b>234 - Syrett - Paunsaugunt - Ustorthents families complex, 30 to 65 percent slopes.</b>					
Depth Class:	Shallow	Available Water Capacity:	0.5 - 7"	Common Trees:	Ponderosa pine
Drainage Class:	well drained	Dominant Parent Material:	Limestone and Shale	Erosion Hazard:	Mod. High

**234 - Syrett - Paunsaugunt - Ustorthents families complex, 30 to 65 percent slopes.**

Typical Profile:	<b>Syrett</b> 0 to 60" Very Gravelly Loam	<b>Paunsaugunt</b> 0 to 4" Gravelly Silt Loam 4 to 16" Very Gravelly Silt Loam 16" Limestone Bedrock	<b>Ustorthents</b> 0 to 6" Gravelly Loam 6 to 13" Gravelly Silt Loam 13" Weathered Limestone Bedrock
------------------	--	---	---

**236 - Buffmeyer- Rogert - Sawpit families complex, 30 to 60 percent slopes.**

Depth Class:	Shallow to Mod. Deep	Available Water Capacity:	1 - 5"	Common Trees:	Mixed Conifer
Drainage Class:	well to excessively drained	Dominant Parent Material:	Limestone	Erosion Hazard:	Mod. High
Typical Profile:	<b>Buffmeyer</b> 0 to 2" Gravelly Loam 2 to 24" Very Gravelly Clay Loam 24" Limestone Bedrock	<b>Rogert</b> 0 to 12" Very Gravelly Silt Loam 12 to 16" Very Gravelly Loam 16" Limestone Bedrock	<b>Sawpit</b> 0 to 10" Gravelly Silt Loam 10 to 24" Extremely Gravelly Silt Loam 24" Limestone Bedrock		

**277 - Zillion - Hesperus families complex, 15 to 40 percent slopes.**

Depth Class:	Deep to Very Deep	Available Water Capacity:	4.5 - 11.5"	Common Trees:	Ponderosa pine
Drainage Class:	well drained	Dominant Parent Material:	Basalt	Erosion Hazard:	Mod.
Typical Profile:	<b>Zillion</b> 0 to 9" Loam 9 to 18" Gravelly Loam 18 to 25" Gravelly Clay Loam 25 to 44" Extremely Cobbly Clay Loam 44" Basalt Bedrock	<b>Hesperus</b> 0 to 12" Loam 12 to 60" Silty Clay Loam			

**282 - Tolman, dry family - Rock outcrop complex, 15 to 40 percent slopes.**

Depth Class:	Shallow	Available Water Capacity:	1 - 2.5"	Common Trees:	Pinyon and Juniper
Drainage Class:	Excessively drained	Dominant Parent Material:	Volcanic Rocks	Erosion Hazard:	Mod.
Typical Profile:	<b>Tolman</b> 0 to 6" Very Gravelly Loam 6 to 12" Very gravelly Sandy Clay Loam 12" Volcanic Bedrock				

## Wildlife and Fisheries Information

Mammoth Creek has 2 vegetation types that are especially important for wildlife habitat according to DWR Wildlife Biologists. These are 1) the riparian zone along Mammoth Creek itself and 2) the large, mature ponderosa pine component.

Both of these types harbor numerous species of fish, birds, and their prey. *see the Appendix for a complete list of potential species.* There are numerous bird species that use ponderosa pine for both roosting habitat and as a source of food (seed in cones). Riparian zones are used by the largest number of species for a source of water, food, and cover. In addition to birds and fish, there are ungulate species that inhabit the Mammoth Creek area in the summer months.

There are several opportunities that landowners at Mammoth Creek can take in order to improve habitat. See the Bruce Bonebrake Interview in *Recommended Treatments and Practices* section below for a full discussion of wildlife species located at Mammoth Creek and their habitat.

## Endangered Plant and Animal Species Observed or Known to Occur In The Area

According to the Division of Wildlife Resources, there are occurrences of sensitive or species of concern in the general area of the property: *See documentation located in the appendix.* The following table identifies those species:

Species	Listing	Explanation
Cedar Breaks Biscuitroot	USFS	Sensitive Plant List
Northern Goshawk	State	Special Concern Declining Populations

The Endangered Species Act of 1973 states that animals and plants “are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people” (Endangered Species Act, USDI, 1973). Under the act, all forms of fish, wildlife and plant species found to be in a threatened or endangered state are to be conserved and protected. Once officially listed as “threatened or endangered”, the species is given full, legal protection as stated under the act.

While no explicit direction exists in the Cooperative Forestry Assistance Act as amended by the 1990 Farm Bill for landowners being subject to Section 7 of the ESA, recommended management practices may need to be consistent with federal and state laws identified in the Endangered Species Act (ESA).

Section 7 of the ESA states, “...*Both the species and it’s critical habitat must be considered and protected. This section applies to lands owned by the Federal government and state and private lands in which there is some type of federal involvement. Federal involvement usually includes*

*any activities or programs of any kind authorized, funded or carried out, in whole or part, by a federal agency...Activities that are cost-share or come under the auspices of a federal program may not be exempt. If a protected species resides on their land and the land is enrolled in a federal program, then the landowners may be required to contact the U.S. Fish and Wildlife Service”.*

The landowners are advised to contact the Division of Wildlife Resources to ensure any management activities undertaken are in harmony with requirements of the Act. Wildlife surveys may need to be conducted.

## **Aesthetic Resources and Concerns**

One of the biggest concerns in the project area is retention of visually pleasing surroundings. This is primarily a function of current land use activities which include recreational activities and cabin sites.

There are several important considerations in order to maintain visual quality. Stand treatments should focus on retaining healthy and vigorous trees. The numbers of trees retained should be reflective of both visual appeal and fire danger concerns. A trade-off medium between what would be optimum for each should be used - perhaps 100 to 200 trees per acre as a retention target. Second, stand treatments should be conducted in such a manner to reduce logging damage to residual trees. It will be appropriate to utilize stage falling techniques and trees should always be felled in the direction of removal. Skid trails should be located in areas not readily viewed by the public or along major thoroughfares if possible. Trees of poor form and with dwarf mistletoe should be removed. It is preferable that log landings should be located in open or parking areas.

In areas not yet developed, there may be an opportunity to utilize openings created by stand treatments (log landings, turnarounds, etc.) This would be an ideal situation in that soil compaction and disturbance can be concentrated on building site locations.

Fire potential and defensible space need to be balanced with aesthetic quality and screening of buildings since they are often at odds with each other. Landowners should be aware of the need for defensible space, so they can temper their desires to screen buildings and retain as much vegetation as is practical.

## **Resource Description and Management Recommendations**

Inventory Method: 7.5 minute quadrangle maps and USFS-contracted aerial photography was used as a basis for most field activities. Property line locations were determined then plotted on maps, and timber stands were delineated using aerial photos. Stand boundaries were set using timber species and road locations. The cruise method used was a variable plot using a specific basal acre factor (BAF), followed by a fixed plot 1/300 of an acre in size.

## Stand Narratives

### *Stand Attributes*

Stand #	Species	Acres	Aspect	Slope	Trees/Ac.	Dq	Stand Age
A1	PP	21	SW	10	528	6.2	135
A2	PP	41	N	0	555	7.1	80
A3	PP/DF	18	N	35	1105	5.9	140
A4	PP	17	N	5	452	8.0	120
A5	MC	25	N	13	1628	3.9	90
A6	PP/DF	20	NE	7	561	6.3	100
A7	PP	24	S	10	475	7.1	80
A8	PP	16	SE	5	421	6.9	90
A9	PP/AS	13	W	16	552	6.1	137
A10	PP/DF	19	N	15	817	5.3	90
A11	DF/PP/WF	18	NE	15	2461	3.3	80
A12	MC	12	N	20	1363	3.9	90
A14	MC	10	NE	16	576	5.9	105
A15	PP	21	SW	7	328	7.5	100
A16	PP/DF	22	W	10	506	6.1	104
B1	PP	24	N	2	416	7.7	108
B2	MC	42	N	14	639	5.6	80
B3	PP/DF/AS	15	N	10	887	5.8	100
B4	PP	45	S	15	1140	4.9	70
B5	PP	31	S	15	485	6.9	70
B6	MC/AS	21	N	7	1355	4.7	80
B8	PP/DF	17	N	7	547	5.8	80
B9	MC	21	N	10	1375	3.9	80

MC = Mixed Conifer  
ES = Engelmann Spruce

AS = Aspen  
BS = Blue Spruce

DF = Douglas-fir  
PP = Ponderosa Pine

WF = White fir  
AF = Subalpine fir

**Dq:** *Quadratic Mean Diameter; roughly equals the average diameter in inches of all trees in the stand taken at diameter at breast height (4.5 feet above the ground surface on the high ground side).*



## Understory Description

There are three main types of understory vegetation within the project area. Under mixed conifer stands, Oregon grape, forbs and shrubs are typical. And under low sites or a typical ponderosa pine environment, manzanita or bare, weathered sandstone can be found. Riparian zones consist of water birch, chokecherry, and mosses or sedges.

## Fuel Types, Loading and Special Burning, Wildfire or Interface Considerations

*(See Fuel Model Descriptions in the Appendix)*

<b>Fuel Loading, Understory, and General Observations (1997 Inventory Crew)</b>	
<b>Stand</b>	
A1	Light grass and dead needle ground cover. Little or no tree regeneration. Some signs of beetle activity in the area.
A2	Some beetle activity outside the plot, grass and common juniper understory. Very thick with small diameter trees and very little tree regeneration. A lot of needle duff on the forest floor. Forest needs to be thinned. A lot of dwarf mistletoe in the area.
A3	Too steep and unstable for harvesting. Recommend landowners plant trees on exposed slide area. A great deal of tree diversity - bristlecone, limber, fir spruce and ponderosa pine.
A4	A lot of small crowded trees in plot 1. There are fire scars that occurred more than 80 years ago. An old harvest took place in the area, which left some extremely large trees over 50 inches in diameter. A lot of needle duff, little to no tree regeneration, a lot of fallen dead wood.
A5	Aspen regeneration is abundant. The tallest aspen sucker is less than 3 years old (1997). Most lots have already been thinned. Good variety of tree species.
A6	Aspen and ponderosa pine mix with heavy grass and common juniper understory. Some douglas-fir and limber pine. The north end of this stand has more aspen and is less dense. Recommend thinning on the south end of the stand.
A7	Recommend a thinning. Light pinegrass and common juniper understory. Old logging scars and stumps left had abundance of seed trees on the east end of the stand. Landowners have large tracts of property.
A8	When harvested, 3 to 4 seed trees per acre were left. Regeneration from these trees is moderate with a lot of juniper and brush coming in. Thinning next to seed trees may be beneficial to thin large clumps of regeneration. Also recommend planting bare and sun-baked areas. Tall brome and wheatgrass are stabilizing barren areas at present. Some pine beetles.
A9	Understory consists of pine grass, spiny gooseberry, common juniper and aspen regeneration. Very rocky.
A10	Recommend a thinning. Pine duff and pine grass understory. Evidence of spruce budworm.

<b>Fuel Loading, Understory, and General Observations (1997 Inventory Crew)</b>	
A11	Wide variety of tree species. 5% aspen, 40% old spruce, 30% young fir, 20% ponderosa and 5% other.
A12	Very steep. Almost all spruce and fir, some ponderosa. Not overly crowded. Cooley spruce gall aphid present in almost all spruces.
A14	Very steep. Recommend thinning. Some beetle kill.
A15	A lot of lava rock with a common juniper understory. Some aspen and juniper though mostly ponderosa pine. Recommend thinning beetle killed trees. Oldest trees are in the middle of the stand.
A16	Trees are sparse on west side of drainage. Recommend thinning of beetle hit trees. East side is a lot more dense.
B1	Recommend thinning due to an abundance of small and crowded trees, and to remove mistletoe trees. Understory almost barren with some pine grass and common juniper, and manzanita. Some locations have a lot of fallen wood on the ground.
B2	High numbers of young trees that should be thinned. East face has substantial beetle kill and mistletoe infestations. Manzanita and common juniper are predominant ground cover.
B3	Some evidence of past logging. A lot of small, crowded trees. Recommend a thinning to space out small trees and take care of beetle trees. Understory consists of common juniper, pine grass and Oregon grape. Some locations have a lot of fallen downed wood.
B4	Understory consists of pine grass, bitter brush and Oregon grape. Trees are nicely spaced out in some locations, very thick in others.
B5	West end of unit has a lot of small tree regeneration and should be thinned. Pine duff and pine grass are found in the understory.
B6	Very dense stand of ponderosa and douglas-fir. Common juniper and Oregon grape are in the understory. A lot of small tree regeneration and dead, downed wood. Recommend a thinning. Some locations have a lot of slash from past fuelwood gathering.
B8	No beetles or mistletoe noted at the time of inventory, except in Douglas-fir. Understory consists of manzanita, Oregon grape, common juniper and bitterbrush.
B9	Fairly dense, moist site. Ponderosa pine and slowly being crowded out. Thinning recommended. Ground cover is Oregon grape, snowberry, manzanita and common juniper.

### **Specific Wildlife, Aesthetic and Recreational Information**

**Wildlife:** One of the biggest concerns landowners should be aware of is use by and human disturbance of the riparian zone at Mammoth Creek. Numerous species of

wildlife use Mammoth Creek and adjacent areas for forage, cover and as a source of water. Keeping a stable and healthy riparian zone will be of benefit for both wildlife and human interests. In addition, ponderosa pine, especially large trees with wide crowns are important for a number of wildlife species, but especially bird species. Landowners should try to retain as many of these large trees as possible, except where they pose a falling hazard to people or structures.

***Aesthetic:*** Aesthetics and visual resources are important considerations for most landowners at Mammoth Creek. The reason for this is the nature of use - recreational activities. Many times cabins have been oriented in their lots to take advantage of specific views and to avoid cutting specific trees. Stand treatments undertaken in this plan should be thoroughly explained to residents and neighbors to avoid confusion and misunderstandings. Once the reasoning and goals behind a particular project have been explained, many residents will understand the need of the project and accept it based on those goals.

***Recreation:*** Formal recreational activities are engaged in by a large number of residents. Others prefer non-organized and low key recreation. One of the largest segments of organized recreation is OHV (4 wheeler) use on roads in Mammoth Creek and on adjacent USFS managed lands. Conflicts between OHV's and motor vehicles can and do happen. Illegal off-trail use on Forest Service lands is also a problem. While outside the scope of this Forest Stewardship Plan, it is hoped residents individually or collectively take the time to understand regulations for riding on roads both inside the subdivision and outside on USFS lands. "Treading lightly" and not taking machines off of established roads will lessen the likelihood of erosion, tickets and fines for operators, and future OHV restrictions.

## **Specific Soil, Water and Wetland Information**

*(See Soil Map Contained in the Appendix)*

***Soils:*** An obvious concern of resource management deals with the type of equipment used to carry out treatments, and for making improvements, such as road building. Based on information contained the USFS Soil Survey for this area, the following soil types are problematic when considering stand treatments. Because this rating is based on slope and soil wetness (season of use), site-specific planning will need to occur before stand treatments are undertaken.

Table 1

<b>Soil Type</b>	<b>Road/Landing Limitations</b>	<b>Suitability for Log Landings</b>	<b>Soil Rutting Hazard</b>
<b>220 Heasperus</b>	Severe	Poorly Suited	Severe
<b>220 Zillion</b>	Severe	Poorly Suited	Severe
<b>229 Skyview</b>	Severe	Poorly Suited	Severe
<b>229 Syrett</b>	Moderate	Poorly Suited	Slight
<b>234 Syrett</b>	Severe	Poorly Suited	Severe
<b>234 Paunsaugunt</b>	Severe	Poorly Suited	Moderate
<b>234 Ustorthents</b>	Severe	Poorly Suited	Moderate
<b>236 Buffmeyer</b>	Severe	Poorly Suited	Severe
<b>236 Rogert</b>	Severe	Poorly Suited	Slight
<b>236 Sawpit</b>	Severe	Poorly Suited	Severe
<b>240A Sawdust</b>	Slight	Moderate	Slight
<b>240A Shawa</b>	Moderate	Moderate	Severe
<b>277 Zillion</b>	Severe	Poorly Suited	Severe
<b>277 Hesperus</b>	Severe	Poorly Suited	Severe
<b>282 Tolman</b>	Severe	Poorly Suited	Severe
<b>P49 Frandsen</b>	Moderate	Moderate	Severe
<b>P97 Neto</b>	Moderate	Moderate	Severe
<b>P162 Wiggler</b>	Severe	Poorly Suited	Slight
<b>P162 Guben</b>	Severe	Poorly Suited	Slight

Table 2

<b>Soil Type</b>	<b>Hazard of Off-Road or Off-Trail Erosion</b>	<b>Hazard of Erosion on Roads and Trails</b>	<b>Suitability for Natural Surface Roads</b>
<b>220 Heasperus</b>	Moderate	Moderate	Poorly Suited
<b>220 Zillion</b>	Moderate	Moderate	Poorly Suited
<b>229 Skyview</b>	Moderate	Severe	Poorly Suited
<b>229 Syrett</b>	Moderate	Severe	Poorly Suited
<b>234 Syrett</b>	Very Severe	Severe	Poorly Suited
<b>234 Paunsaugunt</b>	Very Severe	Severe	Poorly Suited

Table 2

<b>Soil Type</b>	<b>Hazard of Off-Road or Off-Trail Erosion</b>	<b>Hazard of Erosion on Roads and Trails</b>	<b>Suitability for Natural Surface Roads</b>
<b>234 Ustorthents</b>	Very Severe	Severe	Poorly Suited
<b>236 Buffmeyer</b>	Very Severe	Severe	Poorly Suited
<b>236 Rogert</b>	Severe	Severe	Poorly Suited
<b>236 Sawpit</b>	Very Severe	Severe	Poorly Suited
<b>240A Sawdust</b>	Slight	Moderate	Moderate
<b>240A Shawa</b>	Slight	Moderate	Moderate
<b>277 Zillion</b>	Very Severe	Severe	Poorly Suited
<b>277 Hesperus</b>	Very Severe	Severe	Poorly Suited
<b>282 Tolman</b>	Very Severe	Severe	Poorly Suited
<b>P49 Frandsen</b>	Slight	Moderate	Moderate
<b>P97 Neto</b>	Slight	Slight	Moderate
<b>P162 Wiggler</b>	Severe	Severe	Poorly Suited
<b>P162 Guben</b>	Severe	Severe	Poorly Suited

Table 3

<b>Soil Type</b>	<b>Suitability for Hand Planting</b>	<b>Suitability for Mechanical Planting</b>	<b>Suitability for use of Harvesting Equipment</b>
<b>220 Heasperus</b>	Well Suited	Moderately Suited	Moderately Suited
<b>220 Zillion</b>	Unsuited	Moderately Suited	Moderately Suited
<b>229 Skyview</b>	Unsuited	Unsuited	Moderately Suited
<b>229 Syrett</b>	Well Suited	Unsuited	Moderately Suited
<b>234 Syrett</b>	Unsuited	Unsuited	Poorly Suited
<b>234 Paunsaugunt</b>	Unsuited	Unsuited	Poorly Suited
<b>234 Ustorthents</b>	Poorly Suited	Unsuited	Poorly Suited
<b>236 Buffmeyer</b>	Unsuited	Unsuited	Poorly Suited
<b>236 Rogert</b>	Unsuited	Unsuited	Moderately Suited

Table 3

<b>Soil Type</b>	<b>Suitability for Hand Planting</b>	<b>Suitability for Mechanical Planting</b>	<b>Suitability for use of Harvesting Equipment</b>
<b>236 Sawpit</b>	Moderately Suited	Unsuited	Poorly Suited
<b>240A Sawdust</b>	Well Suited	Moderately Suited	Well Suited
<b>240A Shawa</b>	Well Suited	Moderately Suited	Moderately Suited
<b>277 Zillion</b>	Unsuited	Unsuited	Poorly Suited
<b>277 Hesperus</b>	Unsuited	Unsuited	Poorly Suited
<b>282 Tolman</b>	Unsuited	Unsuited	Poorly Suited
<b>P49 Frandsen</b>	Well Suited	Moderately Suited	Moderately Suited
<b>P97 Neto</b>	Well Suited	Well Suited	Moderately Suited
<b>P162 Wiggler</b>	Moderately Suited	Unsuited	Poorly Suited
<b>P162 Guben</b>	Moderately Suited	Unsuited	Poorly Suited

Table 4

<b>Soil Type</b>	<b>Suitability for Mechanical Site Preparation (surface)</b>	<b>Suitability for Mechanical Site Preparation (deep)</b>	<b>Potential for Seedling Mortality</b>
<b>220 Heasperus</b>	Poorly Suited	Poorly Suited	Moderate
<b>220 Zillion</b>	Poorly Suited	Poorly Suited	Low
<b>229 Skyview</b>	Poorly Suited	Poorly Suited	Moderate
<b>229 Syrett</b>	Poorly Suited	Poorly Suited	Moderate
<b>234 Syrett</b>	Unsuited	Unsuited	High
<b>234 Paunsaugunt</b>	Unsuited	Unsuited	Moderate
<b>234 Ustorthents</b>	Unsuited	Unsuited	Moderate
<b>236 Buffmeyer</b>	Unsuited	Unsuited	High
<b>236 Rogert</b>	Poorly Suited	Poorly Suited	Moderate
<b>236 Sawpit</b>	Unsuited	Unsuited	Moderate
<b>240A Sawdust</b>	Well Suited	Well Suited	Moderate
<b>240A Shawa</b>	Well Suited	Well Suited	Moderate

Table 4

Soil Type	Suitability for Mechanical Site Preparation (surface)	Suitability for Mechanical Site Preparation (deep)	Potential for Seedling Mortality
<b>277 Zillion</b>	Unsuited	Unsuited	High
<b>277 Hesperus</b>	Unsuited	Unsuited	High
<b>282 Tolman</b>	Unsuited	Unsuited	High
<b>P49 Frandsen</b>	Well Suited	Well Suited	Moderate
<b>P97 Neto</b>	Well Suited	Well Suited	High
<b>P162 Wiggler</b>	Unsuited	Unsuited	Moderate
<b>P162 Guben</b>	Unsuited	Unsuited	Low

Although some soils in the project area have severe road construction limitations, road building may not necessarily be precluded. While outside the scope of this plan, it is highly advisable that a Forest Engineer or Civil Engineer be consulted before future road building is undertaken in locations where there are potential problems, based on the type of activity undertaken as outlined in the above table. Doing so may eliminate costly and irreparable mass-wasting and erosion consequences.

**Water and Wetlands:** Water and wetland resources are primarily concentrated in riparian zones along Mammoth Creek. Management activities should be avoided in these areas because of their value to water quality, sediment filtering, livestock and wildlife. It is recommended that *Utah's Forest Water Quality Guidelines* be employed if management is considered in these locations.

### Specific Insect and Disease problems

As noted above, there are no pressing insect or disease problems at this time. However, in coming years landowners should consider implementing the thinning program outlined below in order to insure continued tree health and vigor. This may prevent future insect outbreaks or lessen their impact on the Mammoth Creek subdivision.

Many agents act independently or in conjunction with each other to hinder the growth of trees. Because of the number of different species found in mixed conifer stands, the number of potentially destructive agents is high, and presents a formidable task in mitigating severe occurrences.

Physical defects (cracks, forks, missing/dead tops, etc.) persist throughout the forest as a consequence of various biotic and abiotic factors influencing the character and structure of the forest. These factors contribute significantly to declining forest health. Structural

defects or wounding of trees exposes the cambium which opens an infection site for insects and diseases of various kinds. Once a tree is damaged, it will compartmentalize the wounded area to prevent spread of infection. Sometimes the tree's defense mechanism is compromised (a good example is drought) or is inadequate to defend the remaining living portions of the tree which could end in death. Structural defects may prematurely cause a tree to fail under its own weight or through strong wind events.

The presence of various species of insects (bark beetles, borers, etc.) is common at differing degrees, whether endemic or epidemic levels, throughout the forest. The most common bark beetles include mountain pine beetle, western pine beetle, spruce beetle, fir engraver beetle and western balsam bark beetle.

Ponderosa pine is subject to infestation by the mountain pine beetle and western pine beetle. Spruce trees are most commonly attacked by the spruce beetle and fir trees by western balsam bark beetle and the fir engraver beetle.

Evidence of spruce budworm, spruce beetle and fir engraver beetle activity was seen occurring in minor, locally isolated areas throughout the property. The spruce budworm which attacks and consumes foliage on true fir, is causing damage, although not at epidemic proportions. The extent of spruce beetle activity has increased in intensity over the past several years and has reached epidemic proportions on neighboring federal lands, decimating or causing extensive mortality of the spruce component in spruce/fir stands. In addition, mountain pine beetle caused mortality in the pine component has been heavy in localized areas of federal ground on lower portions of the Cedar Mountain area. However, where concerns for protecting individual, high value trees on cabin lots exist, it may be necessary to prevent beetle related mortality. Risk to healthy trees can be reduced by utilizing various preventive measures such as stand treatments and chemical control to ameliorate the effects of beetle induced losses.

Silvicultural control usually consists of thinning or selectively removing high risk trees to a desired residual basal area in the stand, and retaining vigorous, healthy trees. Stand structure and species composition also contribute to reducing the degree of beetle activity and subsequent mortality in an area. Stress from drought or injury occur in areas where stand density (crowding) is inadequate for optimum tree growth.

Dwarf mistletoe (*Arceuthobium douglasii*) is one of the most difficult disease problem in mixed conifer forests. Common symptoms of dwarf mistletoe include witches-brooms, stem or branch swelling at point of infection and failure of the host plant to naturally prune. Douglas-fir and ponderosa pine dwarf mistletoe persists throughout the forest in all tree age and size classes. In stands where the disease is advanced, the mistletoe is causing direct mortality in the overstory and is spreading or already exists in advanced stages in the Douglas-fir, true fir, or ponderosa pine understory regeneration. The presence of this disease is also causing high fuel load/biomass accumulations on the forest floor as witches brooms and dead limbs fall from trees.

Landowners' options are limited where dwarf mistletoe occurs. However, the most widely acceptable alternatives include: 1) no action; 2) clear-cut the stand; or 3) reduce



the infestation to a tolerable or manageable level; 4) pruning of high-valued trees. Option three provides a more suitable framework to control or "manage" the disease.

Other diseases such as fungal trunk and root rots also contribute substantially to forest health. Windthrow and stem weakening are common consequences related to root rots and stem decays. Outright death is also a possible outcome, which are some of the many ways fungi contribute to poor forest health. Opportunities which may exist for the landowner include stand thinning to a specified residual basal area, which would decrease between tree competition and increase stand vigor. Removing culled logs, down windthrown material and logging slash from landings and other areas should be emphasized as well. Generally, other insect and disease populations apparently remain at endemic levels.

### **Specific endangered species and historic and cultural information**

A search of Utah's Natural Heritage Database did not yield wildlife species known to be threatened or endangered located on the property. The Division of State History notes no historical sites are known to be present on the property, because no surveys were undertaken.

### **Past Management or other Activities**

Most residents are familiar with and personally know Jack Jenson, Fire Chief of Mammoth Creek. Jack's grandfather, Heber C. Jenson homesteaded what is now the Mammoth Creek subdivision. The original reason for the homestead was to use the property as a base of operations for a cattle operation. Eventually however, Heber Jenson set up a sawmill 5 miles up Mammoth Creek and began harvesting timber on his homesteaded property and adjacent government lands. These government lands would eventually become the Dixie National Forest, but at the time they were not designated as a forest reserve. After the USFS came into being in 1905, they wanted to collect back payments on timber than Heber Jenson had removed. The Courts stepped in however, and determined that Heber would not have to repay timber previously cut.

### **Any other information that may be of importance in the management of the property**

#### ***Entire property:***

Prior to implementation of recommended management treatments, property lines need to be established where they currently do not exist, and then periodically maintained.

#### ***Forest Succession:***

Important for landowners to keep in mind, especially in the Mammoth Creek area, is the concept of forest succession and its' relationship to forest health. "*Succession*" is the transformation of one plant community to a different plant community over time. Individual plant communities have their own set of criteria or composition which defines them. This can happen in slow stages or very rapidly with disturbance (fire, insect epidemic). As an example, consider the interaction of ponderosa pine and the introduction of white fir. White fir is a shade-tolerant conifer while ponderosa pine is a shade-intolerant conifer. When stand conditions are open and sunlight is able to penetrate and reach the forest floor, regeneration of pine often occurs. However, under more dense stand conditions, white fir is favored because there is more shade in a dense stand. Left unchecked, a mixed ponderosa pine stand can be converted into a white fir stand which has implications for wildlife desirability and forest health. The same situation can happen in a mixed aspen and white fir stand.

Forest health is probably most affected by the density of the stand. Each stand has the ability to support any number of trees. However, there is a point at which the stands' ability to do so a carrying capacity and can support so many trees per acre. As the stand grows, trees become bigger and the stand can then support fewer trees. As density-related mortality occurs, the residual trees become stressed in their competition for nutrients, water and light. As the health of the forest continues to decline, conditions for insect and disease attack become more favorable.

One strategy used to reduce competition and maintain tree vigor is to thin the forest. Typically, thinning involves removing trees that are inferior for some reason or are "excess" and are not needed. Removal of these trees concentrates growth potential on those remaining trees resulting in a more healthy stand.. The basic goal of thinning treatments is to maintain stand health over time, recognizing that structure and composition will change as trees grow and compete with each other. In addition, thinnings can be a good way of dealing with hazardous fuel (trees and downed wood) from a wildland fire standpoint.

In essence, as trees grow and mature over time, changes in stand structure and composition occur. Competition amongst individual trees also increases. While these changes occur very slowly, over the course of several decades, changes in the trees' ability to withstand an insect attack or fire also change. For example, an overstocked stand (i.e. thick with a high degree of competition) is more likely to be attacked by bark beetles as opposed to a stand that has been treated or thinned. The same analogy can be used for fire.

## **Stand Management Recommendations**

Recommended Treatment and Desired Outcomes of Treatment of Stand (See *FVS and SVS Outputs located in the Appendix*)

Stand(s)	Recommended Treatment(s)	Desired Outcome(s)	Limitations
A1, A2, A4, A6, A7, A8, A9, A10, A15, A16, B1, B2, B5, B8	<b>Sanitation Treatment</b>  (removal of trees of poor form, poor health, diseased trees, insect infested trees, etc)	<ul style="list-style-type: none"> <li>* Increase forest health by decreasing insect and disease activity and decreasing tree density</li> <li>* Decrease likelihood and possibly severity of mountain pine beetle outbreaks</li> <li>* Decrease number and risk associated with hazard trees around cabins</li> <li>* Decrease likelihood and severity of wildfire.</li> <li>* Increase rate of tree growth and vigor in the stand.</li> </ul>	<ul style="list-style-type: none"> <li>* May want to exclude areas near Mammoth Creek as trees are not a falling hazard to promote snag retention for wildlife.</li> </ul>
A3, A11, A12	<b>1) Sanitation Treatment</b>  (removal of trees of poor form, poor health, diseased trees, insect infested trees, etc)  <b>2) White fir Removal</b>  <b>3) Thin from Below (take small trees first) to 150 residual trees per acre target</b>	<ul style="list-style-type: none"> <li>* Increase forest health by decreasing insect and disease activity and decreasing tree density</li> <li>* Decrease likelihood and possibly severity of future mountain pine beetle outbreaks</li> <li>* Decrease number and risk associated with hazard trees around cabins</li> <li>* Decrease likelihood and severity of wildfire.</li> <li>* Increase rate of tree growth and vigor in the stand.</li> <li>* Decrease amount and level of spruce budworm activity</li> <li>* Decrease ladder fuels (white fir and thin from below)</li> <li>* Retention of large diameter healthy trees for aesthetics</li> </ul>	<ul style="list-style-type: none"> <li>* May want to exclude areas near Mammoth Creek as trees are not a falling hazard to promote snag retention for wildlife.</li> <li>* In practical terms, not all white fir will ever be removed from the stand, but a majority will be removed.</li> </ul>

Stand(s)	Recommended Treatment(s)	Desired Outcome(s)	Limitations
A5, B3, B6, B9	<b>1) Thin from Below (priority on removal of small trees); 100 residual trees per acre target</b>  <b>2) Aspen removal</b>	<ul style="list-style-type: none"> <li>* Increase forest health by decreasing insect and disease activity and decreasing tree density</li> <li>* Decrease likelihood and possibly severity of mountain pine beetle outbreaks</li> <li>* Decrease number and risk associated with hazard trees around cabins</li> <li>* Decrease likelihood and severity of wildfire.</li> <li>* Increase rate of tree growth and vigor in the stand.</li> <li>* Decrease ladder fuels (thin from below)</li> <li>* Retention of large diameter healthy trees for aesthetics</li> <li>* Regenerate aspen via the coppice method</li> </ul>	<ul style="list-style-type: none"> <li>* May want to exclude areas near Mammoth Creek as trees are not a falling hazard to promote snag retention for wildlife.</li> </ul>
A14	<b>Thinning with a residual target of 240 trees per acre leaving equal proportions of Douglas-fir, white fir, Engelmann spruce, Ponderosa pine, limber pine and rocky mountain juniper.</b>	<ul style="list-style-type: none"> <li>* Increase forest health by decreasing insect and disease activity and decreasing tree density</li> <li>* Decrease likelihood and possibly severity of bark beetle outbreaks</li> <li>* Decrease number and risk associated with hazard trees around cabins</li> <li>* Decrease likelihood and severity of wildfire.</li> <li>* Increase rate of tree growth and vigor in the stand.</li> <li>* Decrease ladder fuels (thin from below)</li> <li>* Retention of large diameter healthy trees for aesthetics</li> <li>* Insure that a large mixture of species are retained for aesthetics.</li> </ul>	<ul style="list-style-type: none"> <li>* May want to exclude areas near Mammoth Creek as trees are not a falling hazard to promote snag retention for wildlife.</li> <li>* If done commercially care should be taken that one species is not favored over another (high valued commercial species are retained in equal numbers with lesser valued species).</li> </ul>

Stand(s)	Recommended Treatment(s)	Desired Outcome(s)	Limitations
B4	<p><b>1) Sanitation Treatment</b> (removal of trees of poor form, poor health, diseased trees, insect infested trees, etc)</p> <p><b>2) Rocky mountain juniper Removal</b></p> <p><b>3) Thin from Below (priority on removal of small trees); 150 residual trees per acre target</b></p>	<ul style="list-style-type: none"> <li>* Increase forest health by decreasing insect and disease activity and decreasing tree density.</li> <li>* Decrease likelihood and possibly severity of mountain pine beetle outbreaks.</li> <li>* Decrease number and risk associated with hazard trees around cabins</li> <li>* Decrease likelihood and severity of wildfire.</li> <li>* Increase rate of tree growth and vigor in the stand.</li> <li>* Decrease ladder fuels (white fir and thin from below)</li> <li>* Retention of large diameter healthy trees for aesthetics</li> </ul>	<ul style="list-style-type: none"> <li>* May want to exclude areas near Mammoth Creek as trees are not a falling hazard to promote snag retention for wildlife.</li> <li>* In practical terms, not all juniper will ever be removed from the stand, but a majority will be removed.</li> </ul>
Riparian Zone	<b>Retention of Woody Vegetation</b>	<ul style="list-style-type: none"> <li>* Maintain wildlife habitat for birds (roosts) and stream shading for fish</li> <li>* Establishment of a 100 to 200 foot no-impact buffer strip along Mammoth Creek</li> <li>* Retention of large diameter ponderosa pine trees</li> </ul>	<ul style="list-style-type: none"> <li>* High-risk woody vegetation that could threaten structures or be hazardous to humans should be removed regardless of whether it is good wildlife habitat or not</li> </ul>
Riparian Zone	<b>Wildlife Plantings</b>	<ul style="list-style-type: none"> <li>* Increase and enhance plant species used by wildlife for food and shelter</li> <li>* Improve and better stabilize wildlife habitat at Mammoth Creek</li> <li>* Stabilize Streambanks for erosion control</li> </ul>	<ul style="list-style-type: none"> <li>* Plant coyote willow, woods rose, water birch, red-osier dogwood, and narrowleaf cottonwood.</li> </ul>
All Areas	<b>Installation of Bird and Bat Boxes</b>	<ul style="list-style-type: none"> <li>* Improve roosting and nesting structures for bird and bat species</li> </ul>	<ul style="list-style-type: none"> <li>* None</li> </ul>
All Areas	<b>Establish Rules for operating OHV's in and around the subdivision</b>	<ul style="list-style-type: none"> <li>* Lessen erosion and resource destruction</li> <li>* Lessen OHV/resident conflicts</li> <li>* Lessen OHV/USFS Law Enforcement conflicts</li> <li>* Lessen OHV/Wildlife conflicts</li> </ul>	<ul style="list-style-type: none"> <li>* Planning and implementation should be conducted with input from USFS Cedar Ranger District, Recreation Personnel</li> </ul>

## **Specific Actions Needed to Protect Valuable or Endangered Resources**

None needed because endangered species are not thought to inhabit the property based on DWR threatened and endangered species information.

## **Future Actions That May Be Required**

Future monitoring of stand conditions should occur on a periodic and regular basis. Activities such as regeneration and stocking surveys, insect and disease problems can be identified early and corrective measure implemented. This Forest Stewardship Plan should also be revised on a periodic basis to reflect changes in landowner objectives and changing conditions.

## **Forest Resource Protection**

### ***Soils***

Soils represent the most important resource in any forest community. Without soils, timber, vegetation, wildlife and the ecosystem itself cannot exist. Soil protection with regard to human activities is paramount in importance. Practices in herein should always be conducted using Best Management Practices and Utah's newly adopted Forest Water Quality Guidelines which echo BMP recommendations.

The biggest threat to soils in the Mammoth Creek area are man's activities. Removal of forest products incorrectly, road building in unsuitable areas and construction can dramatically speed water erosion and loss of the soil resource. Resource professionals should be consulted whenever there is a threat of potential of soil loss due to human activity. Foresters, Engineers, Range Conservationists and many others should be allowed to comment whenever a management activity is likely to impact the soil resource. It is always better to expend additional effort in seeking out sound advice that to mitigate a management activity which has caused resource damage.

### ***Fire***

Wildland fires continue to be a major concern throughout the Intermountain west. The hazard of wildfire can be significantly increased if management activities are not implemented correctly. Properly implemented, forest management can decrease the risk of catastrophic fire and fire hazards. While no fire management plan or policy is required to be implemented on private lands, it would be advantageous for the landowner to address issues related to fire and fuels management.

Excessive slash accumulation, ground fuels (duff, leaf litter, dead wood, brush and regeneration), snags and their continuity contribute to potential fire hazards. Thus, reducing hazardous fuels will likely reduce the potential for fire occurring as well. Firebreaks and fuel reduction practices are effective fire control precautions. Proper

treatment of slash and fuels modification are an important component in the overall health and productivity of the forest.

The construction of fuelbreaks allows for a change in fuels, stand structure, stocking densities and serves as a barrier against the spread of fire. Reducing fuels in certain areas also reduces the rate of spread and fire intensity. These areas could be strategically located throughout the forest. Another advantage is that site disturbance is minimized.

### ***Insects and Disease***

The recommended practices scheduled to be implemented for the stands discussed in this plan are geared toward achieving several goals. One of those targets is mitigating the problems associated with forest insect and diseases before they reproduce to epidemic proportions. However, the long-term management of the timber resource will undoubtedly encounter forest insect and disease problems during the life of the forest. It is thus, important that these issues be addressed so that potential outbreaks or infestations can be prevented or at least held to a minimum.

In addition to initial timber harvesting, post harvest operations should include effectively reducing the slash build-up either by controlled burning or removing the slash (lopping and scattering, firewood sales). Burning the slash will remove potential brooding sites where insects can overwinter and attack healthy trees the following year. The lop and scatter method would serve to reduce the suitability of slash debris by taking all slash debris over 4 inches in diameter and cutting it to 18 inches or less in length, and scattering it in areas exposed to full sun throughout the cutting site. The sun helps to dry the wood quickly which reduces the suitability of it for insect brooding sites. This method also maintains a nutrient base as the slash deteriorates into the soil.

Continued monitoring of the forest resources for signs of insects and disease problems will need to be undertaken to reduce the possibility of insect or disease epidemics.

### ***Animal***

Big game (deer, elk, etc.), porcupine and other small animals can cause substantial tree and seedling damage by eating the bark, girdling trees and burrowing under root systems. Deer and elk may cause considerable tree deformity and even mortality to young pine and aspen by rubbing their antlers against the stem of the tree. Porcupine, too, are notorious for causing extensive damage to trees, especially in the tops which causes multiple stems to develop, deformity and possibly death.

### ***Other***

Ground-based logging, and other such disturbances can lead to unnecessary damage and death to residual trees. However, this damage can be mitigated through careful felling of trees (to minimize top and stem breakage to residual trees), limiting skidding distances, removing branches from the three exposed faces of a felled tree and limiting

the length of trees that are skidded. Buffer zones should be recognized where sensitive riparian communities exist.

In general, forested areas with slopes greater than 30% should not be logged by traditional tractor/skidding yarding systems because of potential increases in erosion, soil compaction and site disturbance. However, cable logging systems or other specialized logging methods can be used to harvest timber on this unit.

Harvesting in these areas should be accomplished through careful consideration of the effects of removals on water quality, soil stability and wildlife/fisheries habitat. Generally, observing a 75 foot streamside management zone, (SMZ), for riparian areas and where logging activity such as skid trails, landings, roads and timber harvesting takes place is recommended.



## Practice Implementation Schedule

<b>Stand</b>	<b>Activity</b>	<b>Acres</b>	<b>Year</b>
A1	Sanitation Thinning	21	2006
A2	Sanitation Thinning	41	2003
A3	Sanitation/Thinning (white fir & from below)	18	2004
A4	Sanitation Thinning	17	2004
A5	Thin from below/aspen removal	25	2004
A6	Sanitation Thinning	20	2004
A7	Sanitation Thinning	24	2004
A8	Sanitation Thinning	16	2005
A9	Sanitation Thinning	13	2005
A10	Sanitation Thinning	19	2005
A11	Sanitation/Thinning (white fir & from below)	18	2005
A12	Sanitation/Thinning (white fir & from below)	12	2007
A14	Thin to 240 trees per acre; equal proportions	10	2007
A15	Sanitation Thinning	21	2007
A16	Sanitation Thinning	22	2007
B1	Sanitation Thinning	24	2006
B2	Sanitation Thinning	42	2006
B3	Thin from below/aspen removal	15	2003
B4	Sanitation, juniper removal, thin from below	45	2006
B5	Sanitation Thinning	31	2006
B6	Thin from below/aspen removal	21	2006
B8	Sanitation Thinning	17	2003
B9	Thin from below/aspen removal	21	2003
Riparian Zone	Retention of Woody Vegetation	50	Whenever Stand Treatment Occurs
Riparian Zone	Wildlife Plantings	50	Every Year
All Areas	Installation of Bird and Bat Boxes	765	Every Year
All Areas	OHV Operating Rules	765	Every Year

## Certifications and Approvals

### ***Professional Forester Certification:***

I have prepared this Forest Stewardship Plan. Resource professionals have been consulted and/or provided input as appropriate during the preparation of this plan.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
Clint Reese, Area Forester

### ***Area Manager's Approval:***

This plan conforms to guidelines and approved procedures established in the SW Area for Forest Stewardship Plans. I agree with management recommendations contained herein.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
Ron Larsen, Area Manager

### ***State Forester's Approval:***

This plan meets the criteria established for Forest Stewardship Plans by the Utah Forest Stewardship Committee.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
Ron Gropp, Forest Stewardship Coordinator

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
Joel Frandsen, State Forester

### ***Landowner Certification:***

I have reviewed this plan and agree with the recommendations contained herein. The plan reflects my interests and involvement in its development. Resource management activities on the lands described herein will be conducted in a manner consistent with the practices recommended herein.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
Landowner

## **List of Appendices**

Appendix A - Project Location Map

Appendix B - Stand Location Map

Appendix C - FVS Outputs

Appendix D - SVS Outputs

Appendix E - Soil Types Map

Appendix F - Soil Descriptions

Appendix G - Wildlife Habitat Information

Appendix H - Potential Wildlife Species on this Property

Appendix I - Common Trees and Shrubs

Appendix J - Forest Water Quality Guidelines

Appendix K - Forestry Definitions

Appendix L - State History Correspondence

Appendix M - DWR Correspondence

Appendix N - Bird and Bat Box Specifications

Appendix O - Bruce Bonebrake Interview